Automated Assessment of Symptom Urgency: a pathophysiologic approach

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Automated in-home computer networks for remote monitoring of patient symptoms may allow earlier recognition of new health problems and exacerbation of disease but may also dramatically increase patient report of symptoms. Effective implementations of such systems require the development of methods to identify potentially serious health problems that are reported but may not be recognized by the patient as requiring urgent evaluation. As a component of CAMC™[1], a system for providing remote monitoring and care of patients in the home, we have developed and are implementing a method for automated triage of patient complaints.

Decision making in telephone triage of patient complaints traditionally is based on assessment of several factors including: the degree of discomfort or pain, degree of worry or anxiety the complaint causes in the patient, and the likelihood that delay in evaluation will lead to harm or a catastrophic outcome. A patient using our system to report a new problem may choose to speak directly to a medical professional for further assessment. The patient is encouraged to do so if he feels the problem requires immediate attention. If the patient does not feel the problem is urgent, he can choose among several levels of triage, the time interval in which he expects a response. For those problems that the patient does not perceive to be urgent the automated system also assesses the urgency of the problem and responds with a set of graded actions. These actions range from simply reporting the problem to the physician during the next business day, connecting the patient to a triage nurse or physician for further assessment or recommending that the patient have further assessment in an emergency department. In all cases, the level of urgency assigned by the patient to the problem takes precedence over that of the automated system if the patient selected level is higher than the system calculated level.

Assessment of the medical urgency of a reported symptom is based on a pathophysiologic approach to the potential causes of a symptom. Disease processes causing patient harm or death are mediated by a limited set of pathophysiologic processes that may be categorized as systemic threats to function or organ specific threats to function. Systemic threats to function include loss of circulating blood volume, lack of oxygen delivery to tissues, disturbance of electrolyte and glucose regulation, sepsis, and inability to clear toxins. Localized threats to tissue or organ integrity include hypoperfusion and infarct, localized infection and trauma. These pathophysiologic processes share common symptoms across disease entities.

We have mapped a large set of patient complaints, using SNOMED codes, to one or more particular associated pathophysiologic processes. Each pathophysiologic process has a set of related patient questions associated with it. Patient responses to these questions are automatically scored and used to assess the likelihood of the presence of that particular process.

Assessment of the patients pain, discomfort, or anxiety related to the reported symptom is assessed by automated questions regarding these dimensions of the complaint. Patients who report experiencing significant distress because of their complaint are connected to a triage nurse or physician for further evaluation regardless of calculated medical urgency.

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[1] Abstract 1996 Spring AMIA Symposium. Gertman PM, Henneman W, Siren P, Gaehde S, Fincke BG, Rothendler J, Safran C, Wald J, Sands D, Sargious P, Miller J, Vandever W, Newbold P. CAMC: Design of a Multimedia Electronic Home Healthcare system.